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10/601,416	06/23/2003	Sanjay Agrawal	172033.01	7781

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EXAMINER	
GORTAYO, DANGELINO N	
ART UNIT	**PAPER NUMBER**
2168	

DATE MAILED: 01/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/601,416	AGRAWAL ET AL.	
	Examiner	Art Unit	
	Dangelino N. Gortayo	2168	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-66* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-66* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 June 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/02/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-66 are pending.

Specification

The abstract of the disclosure is objected to because the recited text exceeds the prescribed maximum number of words (more than 150 words). Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claim 53 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claim refers to a "candidate accumulator" in line 5, which is disclosed in the specification as software modules separate from hardware and is non-statutory.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 27-52 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The metes and bounds of the claims are unclear, as the independent claim refers to method steps while the dependent claims refer to a computer readable medium. Correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

7. Claims 1-4, 17-20, 23-25, 27-30, 43-46, 49-51, 53-55, 58-59, 60-62, and 65-66 are rejected under 35 U.S.C. 102(e) as being anticipated by Aggarwal et al. ("Aggarwal" US # 6,922,700 B1).

8. As per claim 1, Aggarwal teaches "compiling a pool of partitioned candidate structures" (column 3 lines 52-63 wherein "building an inverted grid index, a correlation table" compiles possible candidate structures similar to a specific target and performs the same function) "for each query, determining potentially relevant structures and associating at least one partitioning method with each structure" (column 5 lines 7-22 wherein attribute fields are used to specify the partitions of the data points and is equivalent) "selecting potentially relevant structures with associated partitioning methods to add to the pool of partitioned candidate structures" (column 7 line 65 – column 8 line 13 wherein the correlation table is used to run through the data to find potentially relevant data structures and performs similar functions) "determining generalized partitioned structures that may be relevant over a set of queries in the workload and adding them to the pool of partitioned candidate structures" (column 4 lines 9-23 wherein a set of queries is received and a inverted grid index is built, containing an exemplary score table used to list possible candidate structures) "enumerating a set of partitioned physical structures from the pool of partitioned candidate structures" (column 9 line 54 – column 10 line 2 wherein an exemplary score table is used to list possible candidate structures)

9. As per claim 2, Aggarwal teaches "examining the workload to form a set of constraints on structures that may be added to the pool of partitioned candidate

structures" (column 10 lines 3-18 wherein the scores from the score table can be used to form constraints on the similarity candidates and is analogous).

10. As per claim 3, Aggarwal teaches "the set of constraints is a set of column-subsets on which structures can be partitioned" (column 10 lines 34-48 wherein the score table contains coordinates that include column values, and is similar).

11. As per claim 4, Aggarwal teaches "the set of column-subsets is generated by evaluating a total cost of all queries in the workload that reference a given column-set and selecting column-sets that have a relatively high total cost of queries" (column 11 line 57 – column 12 line 10 wherein the score table is used to find similarity scores, which are used for comparison and performs the same function).

12. As per claim 17, Aggarwal teaches "selecting a set of potentially relevant structures that returns a lowest optimizer estimated cost for the query" (column 12 line 56 – column 13 line 7 wherein a count is kept to find the highest frequency, and the lowest costing optimizer, and is similar)

13. As per claim 18, Aggarwal teaches "merging partitioned structures in the pool of partitioned candidate structures" (column 12 lines 19-44 wherein a "second level of discretization" is used to merge the different data from the inverted grid list and performs the same function).

14. As per claim 19, Aggarwal teaches "recursively pair wise merging all the partitioned structures in the pool" (column 11 lines 43-56 wherein each entry in the inverted grid list within the inverted grid index is incremented and the score value is found, performing a similar step) "selecting a merged structure that provides a highest

cost benefit with respect to the workload" (column 11 lines 49-56 wherein "a new entry is added to the score table" is an analogous step) "adding the selected merged structure to the set of partitioned candidate structures" (column 12 lines 11-18 wherein the correlation capture is completed to select the relevant data points, and is similar to the step outlined) "returning to the pair wise merging step" (column 12 lines 11-18 wherein the relevant candidate data is reported back as the search result, and is analogous).

15. As per claim 20, Aggarwal teaches "associating at least one partitioning method with each merged partitioned structure" (column 5 lines 46-58 wherein the equal range partitioning method is utilized for the data and is analogous).

16. As per claim 23, Aggarwal teaches "associating a partitioning method identical to one associated with another structure that is relevant to a query that the merged structure is relevant to" (column 5 lines 46-58 wherein the equal range partitioning method is chosen to build the grids, and is relevant to a query to user enters into the system, and is similar).

17. As per claim 24, Aggarwal teaches "a constraint that any potentially relevant structure must have a partitioning method associated with it that is identical to a partitioning method of the table that the structure references" (column 5 line 59 – column 6 line 3 wherein the partitioning method is chosen to be application dependant, and is an analogous constraint).

18. As per claim 25, Aggarwal teaches "the partitioning method associated with the merged partitioned structure is determined by selecting a range partition method based on one of the queries in the workload" (column 7 line 65 – column 8 line 13 wherein the

data is shown with column type and an ordered sequence of values, and is used to examine the data, which is a similar step).

19. As per claim 27, this claim is rejected on grounds corresponding to the arguments given above for rejected claim 1 and is similarly rejected.

20. As per claims 28-30, these claims are rejected on grounds corresponding to the arguments given above for rejected claims 2-4 and are similarly rejected.

21. As per claims 43-46, these claims are rejected on grounds corresponding to the arguments given above for rejected claims 17-20 and are similarly rejected.

22. As per claims 49-51, these claims are rejected on grounds corresponding to the arguments given above for rejected claims 23-25 and are similarly rejected.

23. As per claim 53, Aggarwal teaches "a structure partitioner that, for each query, determines potentially relevant structures and associates at least one partitioning method with each structure"(column 5 lines 7-22 wherein attribute fields are used to specify the partitions of the data points and is equivalent) "a structure selector for selecting potentially relevant structures with associated partitioning methods to add to the pool of partitioned candidate structures"(column 7 line 65 – column 8 line 13 wherein the correlation table is used to run through the data to find potentially relevant data structures and performs similar functions) "a structure constructor for augmenting the pool of partitioned candidate structures by determining generalized partitioned structures that may be relevant over a set of queries in the workload and adding them to the pool of partitioned candidate structures"(column 8 lines 49-59 wherein the inverted grid index and correlation table are utilized to identify similarity candidates and is

analogous) "a candidate set enumerator for enumerating a set of partitioned physical structures from the pool of partitioned candidate structures"(column 9 line 54 – column 10 line 2 wherein an exemplary score table is used to list possible candidate structures and is similar).

24. As per claim 54, Aggarwal teaches "examining the workload to form a set of constraints on structures that may be added to the pool of partitioned candidate structures"(column 10 lines 34-48 wherein the score table contains coordinates that include column values, and is similar).

25. As per claim 55, Aggarwal teaches "the set of constraints is a set of column-subsets on which structures can be partitioned" (column 10 lines 34-48 wherein the score table contains coordinates that include column values, and is similar).

26. As per claim 58, Aggarwal teaches "selects potentially relevant structures with associated partitioning methods by selecting a set of potentially relevant structures that returns a lowest optimizer estimated cost for the query"(column 12 line 56 – column 13 line 7 wherein a count is kept to find the highest frequency, and the lowest costing optimizer, and is similar)

27. As per claim 59, Aggarwal teaches "merges partitioned structures in the pool of partitioned candidate structures to augment the pool of candidates"(column 12 lines 19-44 wherein a "second level of discretization" is used to merge the different data from the inverted grid list and performs the same function).

28. As per claim 60, this claim is rejected on grounds corresponding to the arguments given above for rejected claim 53 and is similarly rejected.

29. As per claim 61-62, these claims are rejected on grounds corresponding to the arguments given above for rejected claims 54-55 and are similarly rejected.

30. As per claim 65-66, these claims are rejected on grounds corresponding to the arguments given above for rejected claims 58-59 and are similarly rejected.

Claim Rejections - 35 USC § 103

31. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

32. Claims 5-6, 21-22, 31-32, 47-48, 56, and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aggarwal et al. ("Aggarwal" US # 6,922,700 B1) and further in view of Wang ("Wang" US # 5,758,345).

33. As per claims 5 and 6, Aggarwal teaches "evaluating the query" (column 3 lines 60-64). Aggarwal does not expressly disclose "associating a range partitioning method with the potentially relevant structure if the query comprises a range selection predicate on a single column. The range partitioning method is specified as the single column in the range selection predicate and an ordered sequence of all boundary values of ranges over the single column". Wang discloses "associating a range partitioning method with the potentially relevant structure if the query comprises a range selection predicate on a single column. The range partitioning method is specified as the single column in the

range selection predicate and an ordered sequence of all boundary values of ranges over the single column" (column 8 lines 16-20 and column 14 lines 51-58 wherein range partitioning is used to allocate the data in the data space and is analogous). It would have been obvious at the time of the invention for one of ordinary skill in the art to combine Aggarwal's method of finding candidate structures for data with Wang's use of range partitioning to establish physical database layout. This gives users the advantage of being able to use range partitioning when judging candidate structures. The motivation for doing so would be to optimize the design of a physical database layout.

34. As per claim 21, Aggarwal does not explicitly disclose "the partitioned candidate structures being merged all have range partitioning methods" Wang discloses "the partitioned candidate structures being merged all have range partitioning methods" (column 8 lines 16-20 and column 13 lines 8-21 wherein two documents are merged to find similarities). It would have been obvious at the time of the invention for one of ordinary skill in the art to combine Aggarwal's method of finding candidate structures for data with Wang's use of range partitioning to establish physical database layout. This gives users the advantage of being able to use range partitioning when judging candidate structures. The motivation for doing so would be to optimize the design of a physical database layout.

35. As per claim 22, Aggarwal discloses "the cost of evaluating all queries is computed by: estimating a cost of scanning a subset of partitions required to answer each query based on a size of partitions being scanned and assigning a fixed cost for accessing any partition in answering the query to accumulate a total cost for each

query" (column 8 lines 33-48 wherein the correlation table is used to evaluate the query cost, and if it meets the correlation threshold, disclosing an analogous step).

36. As per claims 31-32, these claims are rejected on grounds corresponding to the arguments given above for rejected claims 5-6 and are similarly rejected.

37. As per claims 47-48, these claims are rejected on grounds corresponding to the arguments given above for rejected claims 21-22 and are similarly rejected.

38. As per claim 56, Aggarwal teaches "associates at least one partitioning method with each potentially relevant structure" (column 3 lines 60-64). Aggarwal does not expressly disclose "associating a range partitioning method with the potentially relevant structure". Wang discloses "associating a range partitioning method with the potentially relevant structure" (column 8 lines 16-20 and column 14 lines 51-58 wherein range partitioning is used to allocate the data in the data space and is analogous). It would have been obvious at the time of the invention for one of ordinary skill in the art to combine Aggarwal's method of finding candidate structures for data with Wang's use of range partitioning to establish physical database layout. This gives users the advantage of being able to use range partitioning when judging candidate structures. The motivation for doing so would be to optimize the design of a physical database layout.

39. As per claims 63, this claim is rejected on grounds corresponding to the arguments given above for rejected claim 56 and is similarly rejected.

40. Claims 7-16, 26, 33-42, 52, 57, and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aggarwal et al. ("Aggarwal" US # 6,922,700 B1) and further in view of Pederson et al. ("Pederson" US # 5,864,842).

41. As per claim 7-8, Aggarwal discloses "associating at least one partitioning method with each potentially relevant structure" (column 5 lines 7-22 wherein attribute fields are used to specify the partitions of the data points and is equivalent). Aggarwal does not explicitly disclose "associating a hash partitioning method with the potentially relevant structure... specified by a set of column types and a number of partitions". Pederson discloses "associating a hash partitioning method with the potentially relevant structure... specified by a set of column types and a number of partitions" (Figure 6A and column 8 lines 11-55 wherein hash partitioning is used to partition a table and is analogous). It would have been obvious at the time of the invention for one of ordinary skill in the art to combine Aggarwal's method of finding candidate structures for data with Pederson's use of hash partitioning to partition candidate structures. This gives users the advantage of being able to use hash partitioning when judging candidate structures. The motivation for doing so would be to optimize queries for determining relevant structures.

42. As per claim 9, Aggarwal discloses "the number of partitions is calculated by iteratively evaluating the cost of executing the query with numbers of partitions that range between upper and lower partition number limits and selecting the number of partitions that has the lowest cost" (column 5 lines 31-45 wherein the number of grids represents partitions and is determined by cost, and is an analogous step).

43. As per claim 10, Aggarwal discloses "the upper limit is a number of distinct values in a column-subset being partitioned" (column 5 lines 31-45 where N is the number of index points and is similar).

44. As per claim 11-12, Aggarwal discloses "the lower limit is a number of processors in the database system" (column 5 lines 31-45 where k is the number of grids stemming from data from various sources and is analogous) "the lower limit is one" (column 5 lines 31-45 where k is the denominator and is at least 1 to be valid).

45. As per claim 13, Aggarwal discloses "rejecting any number of partitions that results in a partition that exceeds an amount of available memory"(column 5 lines 31-45 where the number of partitions cannot exceed the total number of index points and performs the same step).

46. As per claim 14, Aggarwal discloses "rejecting any number of partitions that results in a number of partitions that exceeds a preset partition number limit" (column 5 lines 31-45 where the number of partitions cannot exceed the total number of index points and performs the same step).

47. As per claim 15, Pederson discloses "a plurality of potentially relevant structures are joined for the query and wherein the hash partitioning method associated with each of the potentially relevant structures comprises an identical number of partitions" (column 6 lines 23-61 wherein the hash partitioning is performed to join relevant structures in response to the query and is a similar step).

48. As per claim 16, Aggarwal discloses "the upper partition number limit is the minimum of the following values: the maximum number of distinct values in one of the

plurality of potentially relevant structures, the combined size of the plurality of potentially relevant structures divided by available memory, or a maximum number of partitions allowed by the database system" (column 5 lines 31-45 wherein the number of distinct values acts as the upper partition limit and is analogous).

49. As per claim 26, Aggarwal teaches "determining a minimum number of partitions that results in a partition size less than or equal to an amount of memory allocated for partition storage" (column 4 lines 43-51 wherein the second attribute field determines the size of the partition based on memory available and is analogous).

50. As per claims 33-42, these claims are rejected on grounds corresponding to the arguments given above for rejected claims 7-16 and are similarly rejected.

51. As per claim 52, this claim is rejected on grounds corresponding to the arguments given above for rejected claim 26 and is similarly rejected.

52. As per claim 57, Aggarwal discloses "structure partitioner associates at least one partitioning method with each potentially relevant structure" (column 5 lines 7-22 wherein attribute fields are used to specify the partitions of the data points and is equivalent). Aggarwal does not disclose "associating a hash partitioning method with the potentially relevant structure". Pederson discloses "associating a hash partitioning method with the potentially relevant structure" (Figure 6A and column 8 lines 11-55 wherein hash partitioning is used to partition a table and is analogous). It would have been obvious at the time of the invention for one of ordinary skill in the art to combine Aggarwal's method of finding candidate structures for data with Pederson's use of hash partitioning to partition candidate structures. This gives users the advantage of being

able to use hash partitioning when judging candidate structures. . The motivation for doing so would be to optimize queries for determining relevant structures.

53. As per claims 64, this claim is rejected on grounds corresponding to the arguments given above for rejected claim 57 and is similarly rejected.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Chan et al. (US 6,453,314 B1)

Choy et al. (US 5,960,194)

Ruddy et al. (US 6,269,375 B1)

Malaney et al. (US 2004/0243618 A1)

Chaudhuri et al. (US 6,223,171 B1)

Venkatesh et al (US 6,941,316 B2)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dangelino N. Gortayo whose telephone number is (571)272-7204. The examiner can normally be reached on M-F 7:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey A. Gaffin can be reached on (571)272-4146. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dangelino N. Gortayo
Examiner